from the PID compensator 74a to the current amplifier 75a. Then, the magnetic field generated by the coil 3a is obtained by superimposing the bearing force for holding the rotor 1 in a predetermined position and the magnetic force Fax for offsetting the unbalance of the magnetic force caused by the magnetic field generated due to the motor portion 10.--

IN THE CLAIMS:

Kindly cancel claims 15 and 16 without prejudice or admission.

Kindly amend claims 10, 13 and 14 as follows:

10. (Amended) A magnetic bearing apparatus according to claim 9; wherein the composite magnetic force inferring means comprises a magnetic flux detector for detecting a magnetic flux existing in an air gap between a magnetic pole of the rotor and the stator coils, and second inferring means for inferring the composite vectors of the magnetic force affecting the rotor from the magnetic flux detected by the magnetic flux detector.

13. (Amended) A magnetic bearing apparatus according to claim 12; further comprising a radial position sensor for detecting movement of the rotor in the radial direction thereof in the vicinity of the radial position

sensor; and inferring means for inferring movement of the rotor in the radial direction in the vicinity of the motor based on a positional relationship between the radial position sensor and the motor and an amount of movement of the rotor detected by the radial position sensor; and wherein the composite magnetic force inferring means comprises calculating means for calculating composite vectors of the magnetic force affecting the rotor on the basis of a rotational angle of magnetic poles of the rotor, a magnetic field generated by the stator coils of the motor, and the movement of the rotor in the radial direction in the vicinity of the motor inferred by the inferring means.

14. (Amended) A magnetic bearing apparatus according to claim 13; wherein the calculating means calculates the composite vectors of the magnetic force affecting the rotor on the basis of a database of composite vectors of the magnetic force affecting the rotor and a relationship thereof to the radial movement of the rotor, the rotational angle of the magnetic poles of the rotor, and the magnetic field generated by the stator coils of the motor.

Kindly add the following new claims 17-29:

17. A magnetic bearing apparatus according to claim 8; wherein the magnetic support adjustment means adjusts the magnetic force produced by the supporting coils to reduce

vibration of the motor caused by unbalance in a magnetic force generated by motor and represented by the composite vectors.

18. A magnetic bearing apparatus comprising: a rotor having a permanent magnet with a plurality of magnetic poles; a motor having stator coils for generating a rotary magnetic force to rotate the rotor; magnetic supporting coils for generating a radial magnetic force to magnetically support the rotor at a predetermined location in a radial direction thereof; magnetic force unbalance determining means for determining unbalance in the rotary magnetic force generated by the stator coils resulting from displacement of the rotor from the predetermined location in the radial direction; and radial position adjusting means for adjusting the magnetic force produced by the magnetic supporting coils to reduce the unbalance in the rotary magnetic force.

19. A magnetic bearing apparatus according to claim 18; wherein the predetermined location is a position at which an axis of rotation of the rotor passes through a gravitational center of the rotor.

20. A magnetic bearing apparatus according to claim 18; wherein the magnetic force unbalance determining means comprises a radial direction sensor proximate at least one of the magnetic supporting coils for detecting displacement of the rotor in the radial direction in the vicinity of the

radial direction sensor and outputting a corresponding signal, first estimating means for estimating displacement of the rotor in the radial direction in the vicinity of the motor based on the output signal of the radial direction sensor and a positional relationship between the radial direction sensor and the motor, and second estimating means for estimating the unbalance in the rotary magnetic force generated by the stator coils based on a rotational angle of magnetic poles of the permanent magnet, the magnetic field generated by the stator coils, and the radial displacement of the rotor in the vicinity of the motor estimated by the first estimating means.

21. A magnetic bearing apparatus according to claim 20; wherein the second estimating means comprises a database from which the unbalance in the rotary magnetic force is obtained based on stored data showing a relationship between the unbalance in the rotary magnetic force, the rotational angle of the magnetic poles of the permanent magnet, and the magnetic field generated by the stator coils.

22. A magnetic bearing apparatus according to claim 18; wherein the magnetic force unbalance determining means comprises a magnetic flux detector for detecting a magnetic flux in an air gap between the permanent magnet and the stator

coils, and third estimating means for estimating the unbalance of the magnetic force based on the magnetic flux detected by the magnetic flux detector.

23. A magnetic bearing apparatus comprising: a rotor; a motor having stator coils for generating a rotary magnetic field for rotating the rotor; magnetic supporting coils for producing a magnetic force for magnetically supporting the rotor in a radial direction thereof; composite magnetic force determining means for determining composite vectors of a magnetic force affecting the rotor based on the rotary magnetic field; and magnetic support adjusting means for adjusting the magnetic force produced by the magnetic supporting coils to offset for unbalance in the magnetic force affecting the rotor and represented by the composite vectors of the magnetic force, to thereby reduce vibration of the rotor.

24. A magnetic bearing apparatus according to claim 23; wherein the composite magnetic force determining means comprises a magnetic flux detector for detecting a magnetic flux in an air gap between a magnetic pole of the motor and the stator coils, and means for determining the composite vectors of the magnetic force affecting the rotor based upon the magnetic flux detected by the magnetic flux detector.

25. A magnetic bearing apparatus according to claim 24; wherein the motor is a brushless DC motor comprised of a plurality of magnetic poles fixed to the rotor and the plurality of stator coils wound around the magnetic poles.

26. A magnetic bearing apparatus according to claim 23; wherein the motor is a brushless DC motor comprised of a plurality of magnetic poles fixed to the rotor and the plurality of stator coils wound around the respective magnetic poles.

27. A magnetic bearing apparatus according to claim 23; wherein the composite magnetic force determining means comprises a radial position sensor for detecting radial movement of the rotor in the vicinity of the radial position sensor, means for detecting radial movement of the rotor in the vicinity of the motor based on an output of the radial position sensor and a positional relationship between the radial position sensor and the motor, and calculating means for calculating the composite vectors of the magnetic force affecting the rotor on the basis of a rotational angle of magnetic poles of the rotor, a magnetic field generated by the stator coils, and the radial movement of the rotor in the vicinity of the motor.

28. A magnetic bearing apparatus according to claim 27; wherein the calculating means calculates the composite vectors of the magnetic force affecting the rotor on the basis of a database of from which the composite vectors affecting the rotor are obtained based on stored data showing a relationship between the composite vectors affecting the rotor, radial movement of the rotor, a rotational angle of the magnetic poles of the rotor, and the magnetic field generated by the stator coils of the motor.

29. In a magnetic bearing device having a rotor, a motor for rotating the rotor, and a magnetic supporting coil for supporting the rotor, a method for reducing or eliminating vibration by reducing unbalance in a magnetic force generated by the motor due to run-out of the rotor in a radial direction thereof, comprising the steps of:

using a radial position sensor to detect run-out of the rotor in the vicinity of the radial position sensor;

determining run-out of rotor in the vicinity of the motor based on an output of the radial position sensor and a positional relationship between the motor and the radial position sensor;

detecting unbalance in the magnetic force generated by the motor based on the run-out of the rotor in the vicinity of the motor; and